SITENKO, O.G.

AKHIYEZER, O.I.; SITENKO, O.G. [Sytenko, O.H.]

Diffraction nuclear processes at high energies. Ukr.fiz.zhur. no.1:16-34 Ja-F '58. (MIRA 11:4)

1.Fiziko-tekhnichniy institut AN URSR.
(Collisions (Nuclear physics)

SOV/56-35-1-16/59

AUTHORS: Akhiyezer, A. I., Sitenko, A. G.

TITLE: On the Theory of the Excitation of Hydromagnetic Waves (K teorii vozbuzhdeniya gidromagnitnykh voln)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol. 35, Nr 1, pp. 116 - 120 (USSR)

ABSTRACT: In conductive liquids located in an external magnetic field hydromagnetic and magneto-acoustic waves are able to propagate (Ref 1). Lundquist (Lundkvist) (Ref 2) investigated the behavior of hydromagnetic waves in a liquid (Hg) during the mechanical excitation of waves by means of a revolving disk. It is, finally, possible to excite hydromagnetic waves by means of external variable currents. In the present paper the latter possibility is theoretically investigated, and the intensity of excitation is compared with that attained by mechanical means. First, a perfectly conductive compressible liquid is assumed to exist, which is located in an external magnetic field and is subjected to the action of external currents. The initial equations for the following deliberations are the hydrodynamic basic equations as well as Maxwell's (Maksvell) equations.

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On the Theory of the Excitation of Hydromagnetic Waves SOV/56-35-1-16/59

$\vec{v}(\vec{r},t)$ is here set up as Fourier(Fur'ye) integral, and also for the current density $\vec{j}_0(\vec{k},\omega)$ the Fourier components are written down; the wave equation in the perfect liquid and, further, an expression for the intensity are derived. Furthermore, an expression is also derived for the intensity of excitation as well as for the velocity of the propagation of the hydromagnetic waves in consideration of a damping, by basing on the assumption that the liquid possesses only finite conductivity and is viscous. There are 2 references, 1 of which is Soviet.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR (Physico-Technical Institute, AS Ukrainskaya SSR)

SUBMITTED: January 29, 1958

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SOV/56-35-5-38/56

21(7)

AUTHORS: Sitenko, A. G., Berezhnoy, Yu. A.

TITLE: On the Diffraction Spallation of Light Nuclei (O diffraktsionnom rasshcheplenii legkikh yader)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 5, pp 1289-1291 (USSR)

ABSTRACT: In the present paper the integral cross sections of various processes of the diffraction interaction between a deuteron and a black nucleus is calculated for any ratios R_d/R. Here R_d denotes the radius of the deuteron and R the radius of the nucleus. The Coulomb (Kulon)-interaction was neglected. For the purpose of simplifying calculations a Gaussian function was used as a deuteron wave function. The comparatively easily obtained expressions for the total cross section σ_t of all processes, for the cross sections σ_n and σ_p of neutron and proton stripping respectively, and for the cross section σ_e of elastic scattering are explicitly written down. The cross sections σ_d of diffraction spallation and the absorption

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cross section σ_a of the deuteron can be calculated from the relations $\sigma_d + \sigma_e = \sigma_t/2$, $\sigma_a + \sigma_n + \sigma_p = \sigma_t/2$. Next, approximated formulae for the limiting cases $q \gg 1$ and $q \ll 1$ are given. For the parameter q it holds that $q = 4R/\sqrt{\pi}\, R_d$. As a result of diffraction the total cross section of pion-deuteron interaction is less than the sum of the total cross sections of the interaction between a pion and a neutron and a proton. Diffraction also is due to the fact that spallation of the deuteron is caused by the scattering of a pion by a deuteron in the ground state ($\sigma_d \gg \sigma_e$). In the domain $R < R_d$ the integral cross sections depend in a high degree on the selection of the wave function of the deuteron ground state. There are 2 figures and 4 references, 1 of which is Soviet.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet (Khar'kov State University)

SUBMITTED: June 29, 1958

SOV/58-59-8-18374

Translated from: Referativnyy Zhurnal Fizika, 1959, Nr 8, p 194 (USSR)

AUTHORS: Sitenko, A.G., Stepanov, K.N.

TITLE: On the Interaction Between a Charged Particle and an Electronic Plasma

PERIODICAL: Uch. zap. Khar'kovsk. un-t, 1958, Vol 93, Tr. Fiz. otd. fiz.-matem. fak., Nr 7, pp 5-13

ABSTRACT: The article computes the energy losses of a charged particle moving in a plasma with velocity V. In the computations allowance is made for the thermal motion of both electrons and ions. If $V \gg S_e$ (S_e is the average velocity of the thermal motion of the electrons), then the losses are principally caused by the interaction of the particle with the electrons. When $S_e \gg V \gg S_i$ the contribution of interaction with ions becomes substantial, if

$$\frac{V^3}{S_e^3} \ll \frac{m}{M}$$

(m and M are the masses of the electron and ion respectively). The determination of the magnitude of the losses is also given for the case of highly degenerated electronic gas and for the case where the plasma

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SOV/58-59-8-18374

On the Interaction Between a Charged Particle and an Electronic Plasma

moves as a whole. Neither the thermal motion of the electrons nor the effect of the ions is taken into consideration in the case of an external permanent magnetic field being present. In this case the energy losses due to distant interactions represent Cherenkov radiation. The bibliography has 9 titles.

B.N. Gershman

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SITENKO, A. G., Doc Phys-Math Sci (diss) -- "Direct processes in the interaction of nucleons with nuclei". Khar'kov, 1959. 14 pp (Min Higher Educ Ukr SSR, Khar'kov Order of Labor Red Banner State U im A. M. Gor'kiy), 150 copies (KL, No 22, 1959, 107)

SITENKO, A.G.

21(1,8); 24(5) PHASE I BOOK EXPLOITATION SOV/3369

Vsesoyuznaya mezhvuzovskaya konferentsiya po kvantovoy teorii poley i teorii elementarnykh chastits. Uzhgorod, 1958

Problemy sovremennoy teorii elementarnykh chastits. No. 2: Trudy konferentsii... (Problems in the Modern Theory of Elementary Particles. Nr. 2: Transactions of the All-Union Inter-Vuz Conference on the Quantum Field Theory and the Theory of Elementary Particles) Uzhgorod, Zakarpatskoye oblastnoye izd-vo, 1959. 214 p. 5,000 copies printed.

Ed.: Yu. Lomsadze, Docent; Tech. Ed.: M. Belous.

PURPOSE: This book is intended for physicists, particularly those concerned with problems in the field of elementary particles and the quantum theory.

COVERAGE: This book contains articles on elementary particles originally read at the All-Union Inter-Vuz Conference held at Uzhgorod State University on October 26, 1958. Among the topics discussed are: the spinor field theory, the fusion theory, Lorentz contractions, parity studies, nucleon-nucleon scattering, etc. English abstracts accompany each article. References follow each article.

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PHASE I BOOK EXPLOITATION SOV/3762

Konferentsiya po magnitnoy gidrodinamike. Riga, 1958.

Voprosy magnitnoy gidrodinamiki i dinamiki plazmy; trudy Konferentsii. (Problems in Magnetohydrodynamics and Plasma Dynamics; Transactions of a Conference) Riga, Izd-vo AN Latviyskoy SSR, 1959. 343 p. Errata slip inserted. 1,000 copies printed.

Sponsoring Agency: Akademiya nauk Latviyskoy SSR. Institut fiziki.

Editorial Board: D.A. Frank-Kamenetskiy, Doctor of Physics and Mathematics, Professor; A.I. Vol'dek, Doctor of Technical Sciences, Professor; I.M. Kirko, Doctor of Physics and Mathematics; V.Ya. Veldre, Candidate of Physics and Mathematics; V.G. Vitol, Candidate of Physics and Mathematics; Yu.M. Kruminʹ; and V.Ya. Kravchenko.

Ed.: A. Teytel'baum; Tech. Ed.: A. Klyavinya

PURPOSE: This book is intended for physicists working in the field of magnetohydrodynamics and plasma dynamics.

COVERAGE: This volume contains the transactions of a conference held in Riga, June 1958, on problems in applied and theoretical magnetohydrodynamics. The objects of the conference were the investigation of the basic trends in theoretical and applied magnetohydrodynamics, establishing contact between the people doing research in different branches of magnetohydrodynamics, and promoting the participation of theoretical physicists in problems in applied magnetohydrodynamics. More than 160 persons from different parts of the Soviet Union took part in the conference, and 55 papers were read. Similar conferences are to be held regularly in the future; the next such conference is scheduled to be held in Riga in June 1960. In this present collection of the transactions of the conference, most of the papers and comments on papers are presented by the authors themselves in an abridged form. The book is divided into two parts: the first part deals with problems in theoretical magnetohydrodynamics and plasma dynamics, and consists of 35 articles on such aspects of the problem as the application of magnetohydrodynamics in astrophysics (D.A. Frank-Kamenetskiy), magnetohydrodynamics and the investigation of cosmic-ray variations (L.I. Dorman), acceleration of plasma in a magnetic field (G.V. Gordeyev and M.I. Gubanov), stability of shock waves and magnetohydrodynamics (A.I. Akhiyezer). The second part, consisting of 33 articles, deals with problems of experimental magnetohydrodynamics, including the application of physical simulation for investigation of electromagnetic processes in liquid metals (I.M. Kirko) and the development of electromagnetic pumps (P.G. Kirillov), at the Institute of Physics of the Academy of Sciences, Latvian SSR. Several articles are devoted to induction pumps, electromagnetic crucibles, electromagnetic stirrers for molten metals, and their application in the metallurgical industry including schematic diagrams of their power-supply systems. References are given at the end of most of the articles.

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SITENKO, A. G.

21(0) PHASE I BOOK EXPLOITATION SOV/2081

International Conference on the Peaceful Uses of Atomic Energy, 2d., Geneva, 1958

Doklady sovetskikh uchenykh; yadernaya fizika (Reports of Soviet Scientists; Nuclear Physics) Moscow, Atomizdat, 1959. 552 p. (Series: Its: Trudy, Vol. 1) 8,000 copies printed.

Eds. (Title page): A.I. Alikhanov, Academician; V.I. Veksler, Academician; and N.A. Vlasov, Candidate of Physical and Mathematical Sciences; Ed. of this volume: S.I. Brezdov and D.F. Zaretskiy, Candidates of Physical and Mathematical Sciences; Ed. (Inside book): G.L. Smolyan; Tech. Ed.: Ye.I. Mazel'.

PURPOSE: This collection of articles is intended for scientific research workers and other persons interested in nuclear physics. The volume contains 43 papers presented by Soviet Scientists at the Second Conference on Peaceful Uses of Atomic Energy, held in Geneva in September 1958.

COVERAGE: It is divided into two parts. Part I contains 17 papers dealing with plasma physics and controlled thermonuclear Reactions, and Part II contains 26 papers on nuclear physics, including problems of particle acceleration and of cosmic ray physics. The first paper by L.A. Artsimovich presents a review of Soviet work on controlled thermonuclear reactions. The remaining papers in Part I deal with particular problems in this field.
papers in Part II deal in detail with various problems in nuclear physics, such as the fission of heavy atoms and their isotopes, and with the study of cosmic radiation by means of artificial earth satellites and rockets, described in a paper by S.N. Vernov. The Russian-language edition of the proceedings of the conference is published in 16 volumes. The first 6 volumes contain all the papers presented by Soviet scientists as follows: Volume (1), Yadernaya fizika (Nuclear Physics); Volume (2), Yadernyye reaktory i yadernaya energetika (Nuclear Reactor and Nuclear Power); Volume (3), Yadernoye goryucheye metally (Nuclear Fuel and Reactor Metals), Volume (4), Khimiya radioelementov i radiatsionnykh prevrashcheniy (Chemistry of Radioelements and of Radiation Transformations); Volume 5, Radiobiologiya i radiatsionnaya meditsina (Radiobiology and Radiation Medicine); Volume (6) Polucheniye i primeneniye izotopov (Production and Use of Isotopes). The other 10 volumes contain selected papers presented at the Conference by non-Soviet scientists. In the present volume discrepancies between the English and Russian language) edition of the proceedings have been noted in three articles where the texts are not identical; Akhiyezer, et al, vis; Andrianov, et al, "High Current Pulsed Discharge"; Akhiyezer, et al, "High Frequency Plasma Oscillation"; and Bogolyubov, "Investigations of the Many-body Problem". The serial numbers of reports 2302 and 2504 are reversed in the English edition. Report 2211, by Gimelaikov, et al, is numbered 2536 in the English edition.

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Reports of Soviet Scientists; Nuclear (Cont.) SOV/2081

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SITENKO, A.G. [Sytenko, O.H.]

Theory of nuclear reactions involving complex particles. Ukr. fiz. zhur. 4 no.2:152-163 Mr-Ap '59. (MIRA 13:1)

1.Khar'kovskiy gosuniversitet i Fiziko-tekhnicheskiy institut AN USSR.
(Nuclear reactions)

SITENKO, A.G. [Sytenko, O.H.]; TARTAKOVSKIY, V.K. [Tartakovs'kyi, V.K.]

Diffraction of splitting of deuterons. Ukr.fiz.zhur. 4 no.6:708-723 N-D '59. (MIRA 14:10)

1. Khar'kovskiy gosudarstvennyy universitet im. A.M.Gor'kogo.
(Deuterons--Diffraction)

SITENKO, A. G.

"On the Polarization of Nucleons in High Energy Stripping Reactions," Nuclear Physics, 9, No. 3, Jan 1959, 412-419 (North Holland Publ. Co., Amsterdam)

Abstract: Polarization of Nucleons stripped from deuterons in high energy encounters with nuclei is determined on the basis of the generalized diffraction method in which account is taken of spin-orbit interaction.

Physico-Tech. Inst, Ukr SSR Acad. Sci., Khar'kov

SOV/56-36-3-20/71

21(7)
AUTHOR: Sitenko, A. G.

TITLE: On the Fission of Nonspherical Nuclei (O delenii nesfericheskikh yader)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 3, pp 793-797 (USSR)

ABSTRACT: The bombardment of stable nuclei with fast particles may, if the excitation energy of the compound nucleus is greater than the critical fission energy, lead to fission. In a non-spherical nucleus with rotational degree of freedom the centrifugal force occurring in consequence of a rotation of the nucleus may lead to nuclear fission. The fission of a non-spherical nucleus caused by the absorption of a particle with great momentum may occur directly without the intermediate stage of the formation of a compound nucleus. It may theoretically also be treated as a direct fission process. In the present paper the author theoretically investigates this direct fission as a consequence of a transfer of a large angular momentum of the nucleus by the absorbed particle. First, the fission conditions of a rotating nonspherical nucleus (excentricity $\varepsilon^2 = 1 - b^2/a^2$, $a \geq$) are investigated. Ex-

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On the Fission of Nonspherical Nuclei SOV/56-36-3-20/71

pressions are given for the total energy, Coulomb (Kulon) energy, rotation energy, the variation of energy as a result of deformation, and for the critical value for the square of the torque L_m^2, which leads to fission for $L^2 \geqslant L_m^2$. Further, the energy of the nucleon impinging upon the nucleus is investigated and a formula is derived for the cross section of direct fission in the absorption of a fast nucleon. For high energies of the impinging nucleon this expression coincides with the total absorption cross section:

$$\sigma = \frac{\pi}{2} ab\left(\sqrt{1 - \varepsilon^2} + \frac{1}{\varepsilon} \arcsin \varepsilon\right), \quad E \gg E_m .$$

In conclusion, the direct fission of nonspherical nuclei in the case of the stripping of neutrons is investigated. The author finally thanks A. I. Akhiyezer, K. A. Ter-Martirosyan for discussions, and N. A. Khizhnyak for valuable remarks. There are 7 references, 4 of which are Soviet.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet (Khar'kov State University)

SUBMITTED: June 12, 1958

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21(7)
AUTHORS: Vysotskiy, G. L., Sitenko, A. G. SOV/56-36-4-28/70

TITLE: On the Theory of Direct Nuclear Reactions With the Participation of Polarized Particles (K teorii pryamykh yadernykh reaktsiy s uchastiyem polyarizovannykh chastits)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 4, pp 1143-1153 (USSR)

ABSTRACT: In the introduction, the authors discuss the subjects and the results of a number of English papers (Refs 1-11) dealing with similar problems. The present paper was intended to work out a theory of direct nuclear reactions (stripping reaction and deuteron formation) in which polarized particles participate; such reactions are widely used in nuclear spectroscopy. For their investigations the authors use the method of perturbed waves; the spin-orbit interaction is neglected because it makes a comparatively small contribution to the cross section. Also Coulomb effects are neglected because they are insignificant in the case of sufficiently high energies. The paper deals with a mathematical investigation of the angular distribution and polarization of the products of stripping- and capture reactions during the action of polarized particles

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On the Theory of Direct Nuclear Reactions With the Participation of Polarized Particles

SOV/56-36-4-28/70

upon arbitrarily oriented nuclei. The angular distribution of protons produced in the case of stripping relations under the influence of polarized deuterons has azimuthal asymmetry. An investigation of this asymmetry offers the possibility of determining the spin of the residual nucleus in the final state. Also other possibilities of using stripping reactions with polarized deuterons for the purpose of obtaining additional data on nuclear structure are investigated. In detail, it was found possible to determine the reduced widths for states with different values of the orbital momentum of an absorbable neutron. The formation of deuterons on nuclei by polarized protons is also characterized by the angular distribution with azimuthal asymmetry. The deuterons produced on this occasion are polarized. The capture reaction under the influence of polarized nucleons can be neglected in order to obtain polarized deuterons. The various chapters of this paper deal with the following subjects: The (d,p) stripping reaction with polarized particles. After the problem has been dealt with in a general manner, a special investigation is carried out of three simple cases: a) nucleus and deuterons are not polarized, b) the

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nucleus is not polarized and deuterons are polarized, c) the nucleus is polarized and the deuterons are not. The next part deals with (d,p)- capturing reactions with polarized particles. Again the cases a,b, and c are dealt with specially after a general investigation. In the last chapter the angular distribution and the polarization of protons are finally calculated for the concrete case of the reaction $B^{11}(d,p)B^{12}$ by using the given parameter values. The results obtained are shown by a diagram. The authors thank Yu. Berezhnyy and V. Kharchenko for their help in carrying out numerical computations. There are 1 figure and 15 references.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii Nauk Ukrainskoy SSR Physico-Technical Institute of the Academy of Sciences, Ukrainskaya SSR) Khar'kovskiy gosudarstvennyy universitet (Khar'kov State University)

SUBMITTED: October 2, 1958

21(7) SOV/56-36-5-16/76

AUTHOR: Sitenko, A. G.

TITLE: On the Scattering of Fast π-Mesons on Deuterons
(O rasseyanii bystrykh π-mezonov na deytronakh)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 5, pp 1419-1422 (USSR)

ABSTRACT: Experimental data concerning (π,p) scattering show that elastic collisions have diffraction character at $E_\pi > 1$ Bev, i.e. that scattering occurs mainly at small angles (Refs 1-4). Belenkiy (Refs 5, 6) succeeded in carrying out a theoretical analysis of (π,p)-scattering on a general basis, Grishin and Saytov (Ref 7) investigated (p,p) scattering at high energies in a similar manner; further investigations of (π,p)-scattering were carried out by Blokhintsev, Barashenkov and Grishin (Ref 8) and furnished results concerning the proton radius and nucleon structure. The author of the present paper investigates (π,d)-scattering; at high pion energies it is also diffraction scattering at which the shadow effects must be taken into account, the existence of which was pointed out for the first time by Glauber. The investigation was carried out by the author in accordance with

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On the Scattering of Fast π-Mesons on Deuterons SOV/56-36-5-16/76

the method developed by Belen'kiy. Expressions are given for the total-, the scattering-, and the absorption cross section, and further also for the corresponding angular distributions. The equations obtained are evaluated by means of experimental data in references 1 and 2 for E_π = 1.4 Bev, and results are shown by two diagrams. The integral (π,d) scattering cross section is found to be equal to the double elastic (π,p) scattering cross section. In the (π,d) absorption cross section the shadow effect is distinctly marked. Figure 1 shows the course of angular distribution in the case of (π,p)-scattering and figure 2 shows that in the case of (π,d) scattering. The author thanks A. I. Akhiyezer for discussing the results obtained. There are 2 figures and 10 references, 4 of which are Soviet.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet (Khar'kov State University)

SUBMITTED: October 30, 1958

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SOV/53-67-3-1/4

24(5), 21(7)
AUTHOR: Sitenko, A. G.

TITLE: The Interaction of Deuterons With Nuclei (Vzaimodeystviye deytonov s yadrami)

PERIODICAL: Uspekhi fizicheskikh nauk, 1959, Vol 67, Nr 3, pp 377-444 (USSR)

ABSTRACT: The present paper gives a very detailed survey of the important field of deuteron-nucleus interaction; the survey is essentially theoretical. In the introduction the problem as such is discussed in short. Chapter I deals with the interaction between deuterons and nuclei within the range of low and medium energies. First, the elastic scattering of deuterons is investigated, and the part played by Coulomb (Kulon) interaction, deuteron structure and its influence upon elastic scattering, the effect of tunneling through the barrier and the scattering of mean energy deuterons on heavy nuclei (Rutherford (Rezerford) scattering) are subjected to a short mathematical treatment. The following paragraph deals with the stripping reactions (d,p) and(d,n); the two-step process $A + d \rightarrow C \rightarrow B + p$ (formation of a compound nucleus) and the direct $A + d \rightarrow B + p$ process are discussed in short, and in the following, the energy relations, the angular distributions in the case of

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such stripping reactions, consideration of spins, the plane wave approximation method, transition to the Serber model, and consideration of the finite nuclear mass are discussed and a short comparison with experimental results is made (Figs 4-6). Further, the consideration of deuteron- and proton waves is investigated and compared with experimental data; in the following it is shown in what way such stripping reactions may render an investigation of nuclear structure possible. Further, this paragraph deals with the effects exercised by polarization in stripping reactions, with angular correlations in (d,pγ) and (d,nγ) reactions, with deuteron production in nucleon-nucleus collisions, as well as with other direct processes developing with the participation of deuterons. Paragraph 4 deals with (d,p) and (d,n) reactions connected with the formation of a compound nucleus. The following subjects are discussed in detail: determination of reaction amplitudes, and the cross sections of such reactions. Paragraph 5 deals with the inelastic scattering of deuterons. First, the possible kinds of processes are discussed in short, after which the excitation of the nucleus in the scattering of deuterons and deuteron disintegration in scattering are dealt with. Paragraph 6 deals with the interaction between deuterons and

heavy nuclei. The individual sections of this paragraph investigate deuteron reactions in the Coulomb field, the (d,p) reaction on heavy nuclei, and deuteron disintegration in the nuclear Coulomb field. Part II of this paper deals with the interaction between deuterons and nuclei in the high energy range. Paragraph 7 deals with the diffraction interaction of deuterons and nuclei, and in the individual subsections the author discusses general problems of nuclear diffraction, the diffraction scattering and diffraction disintegration of deuterons, the stripping reactions at high energies, the total deuteron-nucleus diffraction cross sections, and the interaction between fast nucleons with deuterons. Paragraph 8 deals with the disintegration of fast deuterons in the nuclear Coulomb field and, specifically, with electric and magnetic deuteron disintegration, and with neutron polarization in electromagnetic deuteron disintegration. In paragraph 9 the author finally investigates deuteron production in the case of collisions between fast nucleons and nuclei and discusses the methods of deuteron production and direct as well as indirect capture. In chapter III mathematical problems concerning an integral and the pseudopotential are discussed in short. There are 18 figures and 125 references, 25 of

which are Soviet.

SITENKO, A.G.[Sytenko, O.H.]; TARTAKOVSKIY, V.K. [Tartakovs'kyi, V.K.]

Polarization and quadrupolarization of deuterons in elastic scattering on nuclei. Ukr. fiz. zhur. 5 no. 5:581-590 S-O '60. (MIRA 14:4)

1. Fiziko-tekhnicheskiy institut AN USSR i Khar'kovskiy gosudarstvennyy universitet.

(Deuterons--Scattering)

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B006/B063

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AUTHORS: Sitenko, A. G., Gur'yev, V. N.

TITLE: Inelastic Scattering of High-energy Electrons by Nuclei

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 39, No. 6(12), pp. 1760-1765

TEXT: A theoretical study has been made of inelastic scattering of fast electrons by nuclei, which is accompanied by ejection of nucleons from the nucleus. Such investigations furnish data on the dynamic properties of nuclei. There are two types of inelastic scattering; inelastic electron scattering may be accompanied by excitation of higher energy levels of the nucleus and furnishes data on the nuclear levels. On the other hand, it may also lead to an electrodisintegration (emission of protons or neutrons) and thus gives direct information on the momentum distribution of nucleons in the nucleus, which depends on their spatial correlation. These data are important to the further development of the theory of nuclear structure, especially for the mode of two-particle interaction between the nucleons. The electromagnetic interaction between a fast electron and a nuclear

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proton, which is considered a non-relativistic particle, is discussed, and the ejection probability for this proton is calculated in a perturbation-theoretical manner. An expression is derived for the matrix element of the interaction energy, in which only the two-particle correlation is taken into account. For the limiting case of a high momentum of the ejected proton one obtains

$$d\sigma = \frac{4e^4}{(q^2-\Delta E^2)^2} Z(A-1) S g(\mathbf{q}-\mathbf{K}) \delta(\Delta E - s_p - \tfrac{1}{2}E_p)\, dk' d\mathbf{K}, \qquad (9)$$

где

$$g(\mathbf{q}-\mathbf{K}) = \frac{1}{Z(A-1)} \sum_{\alpha\beta} \frac{1}{(2\pi)^3} \int d\mathbf{r}_2 \left| \int d\mathbf{r}_1 e^{i(\mathbf{q}-\mathbf{K})\mathbf{r}_1} \psi_{\alpha\beta}(\mathbf{r}_1, \mathbf{r}_2) \right|^2, \qquad (10)$$

$$S = \tfrac{1}{2} \sum \left| \bar{u}' \left\{ \left(1 - \frac{q^2-\Delta E^2}{8M^2}(1+2\varkappa)\right)\beta + \right.\right.$$
$$\left.\left. + \frac{i}{2M}(\mathbf{q} - 2\mathbf{K} + i(1+\varkappa)[\mathbf{q}\sigma])\gamma \right\} u \right|^2. \qquad (11)$$

the function $g(\vec{q} - \vec{K})$ is further studied. This function has a sharp maximum for $\vec{q} = \vec{K}$ (i.e., when the momentum of the ejected proton is equal to the momentum loss of the electron). $\vec{q} = \vec{k} - \vec{k}'$ and $\Delta E = E - E'$ are the momentum and energy, respectively, transferred from the electron to the

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proton. e, M, and $\varkappa$ are the charge, mass, and anomalous magnetic moment of the proton; $\hbar = c = 1$. $\Psi_{\alpha\beta}(\vec{r}_1,\vec{r}_2) = \Psi_\alpha(\vec{r}_1)\Psi_\beta(\vec{r}_2)F_{\alpha\beta}(\vec{r}_1-\vec{r}_2)$, $\Psi_{\vec{K}}(\vec{r})$ $= \exp(i\vec{K}\vec{r})$; $\Psi_\alpha(r)$ and $\Psi_\beta(r)$ are the proton and neutron single-particle functions, respectively. One obtains

$g(\vec{q}-\vec{K}) = S_{\vec{p},\vec{P}} \frac{1}{(2\pi)^3}\left|\int d\vec{r}\ \exp(i(\vec{q}-\vec{K}+\vec{P}/2)\vec{r})\varphi(\vec{r})\right|^2$, where S is a quantity averaged over all momentum values of $\vec{p}$ and $\vec{P}$. For the distribution function one obtains

$$g(\varkappa) = \frac{2r_c^2}{\pi\Omega}\left\{\frac{1}{\varkappa^2}\left(\cos\varkappa r_c - \frac{\sin\varkappa r_c}{\varkappa r_c}\right) - \frac{\varkappa^{-1}\lambda\sin\varkappa r_c + \cos\varkappa r_c}{\lambda^2+\varkappa^2}\right\}^2, \quad \varkappa = q - K. \tag{17}$$

This relation is graphically compared with the empirical distribution function obtained for C^{12}:

$g(\varkappa) = \pi^{-3/2}\alpha^{-3}\exp(-\varkappa^2/\alpha^2)$, $\alpha^2/2M = 14$ Mev.

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B006/B063

Inelastic Scattering of High-energy Electrons by Nuclei

Also other functions (e.g., $\alpha^2/2M$ = 18 Mev) are compared herewith. Calculation of $g(\varkappa)$ for C^{12} on the basis of the shell model yields $g(\varkappa) = \frac{1}{3}(2\pi)^{-3}(1+\frac{4}{3}\varkappa^2/\nu^2)\exp(-\varkappa^2/\nu^2)$. For $R = 3.07\cdot10^{-13}$ cm, $\nu^2/2M$ = 5 Mev. Assuming $\nu^2/2M$ = 9.1 Mev, one obtains good agreement with the empirical curve. The energy distribution of electrons inelastically scattered on C^{12} is briefly discussed. A. I. Akhiyezer is thanked for discussions. There are 2 figures and 9 references: 1 Soviet, 7 US, and 1 British.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR (Institute of Physics and Technology, Academy of Sciences Ukrainskaya SSR)

SUBMITTED: July 18, 1960

Card 4/4

ABELISHVILI, T.L.; SITENKO, A.G. [Sytenko, O. H.]

Electric polarization of deuterons due to scattering by a Colulomb field. Ukr. fiz. zhur. 6 no.1:3-11 Ja-F '61. (MIRA 14:6)

1. Khar'kovskiy gosudarstvennyy universitet im. A.M. Gor'kogo.
(Deuterons)
(Polarization (Electricity))

SITENKO, A.G. [Sytenko, O.H.]; TARTAKOVSKIY, V.K. [Tartakovs'kyi, V.K.]

Diffraction interaction of deuterons having semitransparent nuclei with diffuse edges. Ukr. fiz. zhur. 6 no.1:12-19 Ja-F '61. (MIRA 14:6)

1. Khar'kovskiy gosudarstvennyy universitet im. A. M. Gor'kogo.
(Deuterons--Diffraction)
(Nuclei, Atomic)

SITENKO, A.G. [Sytenko, O.H.]; KHARCHENKO, V.F.

Possibility of measuring the polarization arising in the scattering of a neutron by a neutron. Ukr. fiz. zhur. 6 no.1:20-24 Ja-F '61. (MIRA 14:6)

1. Fiziko-tekhnicheskiy institut AN USSR i Khar'kovskiy gosudarstvennyy universitet im. A.M. Gor'kogo.
(Neutrons—Scattering)
(Polarization (Electricity))

3718

S/185/62/007/004/003/018
D407/D301

24.4400

AUTHORS: Sytenko, A. G., and Drobachenko, A. V.

TITLE: On the influence of nucleon correlation on the photo-effect

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 7, no. 4, 1962, 357-359

TEXT: In the present article, the effects due to nucleon correlation are taken into account. The interaction between nucleons leads to a replacement of the rectangular momentum-distribution of a Fermi-gas by a distribution in which the components with large momenta are present. It was shown by S. Watanabe (Ref. 4: Zs. Phys., 113, 482, 1939) that to the ground state of a nucleus with large mass number corresponds a momentum distribution of the nucleonic Fermi-gas at a temperature corresponding to energies of 5 or 8 Mev. One obtains the following formula for the integral cross-section of dipole photon-

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S/185/62/007/004/003/018
D407/D301

On the influence of...

absorption by the nucleus:

$$\int \sigma(W)dW = 0.015A(1 + Bx) \cdot 10^{-24} \text{ Mev} \cdot \text{cm}^2, \quad (1)$$

$$B = \frac{8\pi}{3} \cdot \frac{2M}{\hbar^2} \int_0^\infty \nu(r)V(r)r^4 dr. \quad (2)$$

Assuming that the temperature Θ of the nucleus is low as compared to the temperature of degeneration Θ_0, the correlation function assumes the form:

$$\nu(r) = -\frac{1}{2\pi^4 nr^2} \left\{ \frac{\partial}{\partial r} \frac{\pi\lambda \sin\left(\frac{p_0 r}{\hbar}\right)}{\text{sh}(\pi\lambda r)} \right\}^2,$$

Card 2/4

On the influence of...

$$p_0 = \sqrt{2M\theta_0}\ , \qquad \lambda = \frac{M\theta}{\hbar p_0}\ , \tag{4}$$

where n is the mean nucleon-density. For the coefficient B, one obtains the formula

$$B = \left(\frac{4\pi}{3}\right)^2 s\,\frac{r_0^3\lambda^2}{b}\int_0^1 \left\{\frac{\partial}{\partial y}\,\frac{\sin\left(\frac{p_0}{\hbar}\,by\right)}{\mathrm{sh}(\pi\lambda by)}\right\}^2 y^2\,dy. \tag{6}$$

Numerical values of B, obtained by means of data given in the references, are listed in a table. Analogously, it is possible

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to determine the mean energy of photon absorption, allowance being made for thermal correlation between nucleons. One obtains for the mean energy of absorption $\overline{W}$ = 66 Mev. Thus, taking into account thermal correlations leads to an increase in the mean energy of photon absorption. There are 1 table and 6 references: 3 Soviet-bloc and 3 non-Soviet-bloc. The references to the English-language publications read as follows: J. Levinger, H. Bethe, Phys. Rev., 78, 115, 1950; K. Okamoto, Phys. Rev., 116, 428, 1959.

ASSOCIATION: Kharkivs'kyy derzhuniversytet im. A. M. Gor'kogo (Kharkiv State University im. A. M. Gor'kiy)

SUBMITTED: August 24, 1961

Contribution to the theory of...

functions of particle systems undergoing electromagnetic interaction. V. D. Shafranov calculated the correlation functions of microcurrents from the equations of motion. F. G. Bass, M. I. Kaganov, and V. P. Silin investigated plasma fluctuations, taking spatial dispersion into consideration. The Fourier components of the correlators of charge transverse current density in a plasma read

$$\langle \rho^2 \rangle_{k\omega} = \frac{T}{2\pi} \frac{k^2}{\omega} \frac{\operatorname{Im} \varepsilon_l}{|\varepsilon_l|^2} =$$

$$= \frac{T(ak)^2}{4\sqrt{\pi} as} \frac{e^{-z^2} + \mu e^{-\mu^2 z^2}}{|1 + (ak)^2 - \varphi(z) - \varphi(\mu z)|^2 + (\pi/4) z^2 (e^{-z^2} + \mu e^{-\mu^2 z^2})^2},$$

$$\langle j_r^2 \rangle_{k\omega} = \frac{T}{2\pi} \omega (\eta^2 - 1)^2 \frac{\operatorname{Im} \varepsilon_l}{|\eta^2 - \varepsilon_l|^2} =$$

$$= \frac{T\omega}{\sqrt{\pi}} \left(\frac{\omega}{\Omega}\right)^2 \frac{(1 - \eta^2)^2 z e^{-z^2}}{|\omega^2 (1 - \eta^2)/\Omega^2 - 2\varphi(z)|^2 + \pi z^2 e^{-2z^2}}. \qquad (4)$$

This indicates that at $ka \gtrsim 1$ low-frequency oscillations are the most important factor in fluctuation spectra of ϱ and $\vec{j}$. The correlation

Card 2/9

Contribution to the theory of...

function of the charge density reads

$$\langle \rho(\vec{r}', t)\rho(\vec{r}'', t)\rangle = 2e^2 n_0 \left[\delta(\vec{r}) - \frac{1}{4\pi a^2}\frac{e^{-r/a}}{r}\right], \vec{r} = \vec{r}' - \vec{r}'' \qquad (7).$$

The spectral distributions of fluctuations of the electric and magnetic fields read:

$$\langle \mathbf{E}^2\rangle_{k\omega} = \frac{8\pi T}{\omega}\left(\frac{\operatorname{Im}\varepsilon_l}{|\varepsilon_l|^2} + 2\frac{\operatorname{Im}\varepsilon_t}{|\eta^2 - \varepsilon_t|^2}\right),$$

$$\langle \mathbf{H}^2\rangle_{k\omega} = \frac{16\pi T}{\omega}\eta^2\frac{\operatorname{Im}\varepsilon_t}{|\eta^2 - \varepsilon_t|^2}. \qquad (9)$$

respectively. The resulting correlation functions for the field strengths read:

$$\langle \vec{E}(\vec{r}', t)\vec{E}(\vec{r}'', t)\rangle = 8\pi T\left[\delta(\vec{r}) + \frac{1}{8\pi a^2}\frac{e^{-r/a}}{r}\right], \langle \vec{H}(\vec{r}', t)\vec{H}(\vec{r}'', t)\rangle = 8\pi T\delta(\vec{r}) \quad (10).$$

The spectral distribution of fluctuations in an electron gas for

Contribution to the theory of...

$T \ll mv_0^2/2$ (v_0 - limiting velocity) reads

$$\langle \rho^2 \rangle_{k\omega} = \frac{\pi}{4} \frac{\hbar \zeta k^2}{1 - e^{-\hbar\omega/T}} \left\{ \frac{1}{8} z\theta(1-|z|) \left[\left(\zeta + 1 - \frac{z}{2} \ln \frac{1+z}{1-z} \right)^2 + \left(\frac{\pi z}{2} \right)^2 \right]^{-1} + \right.$$
$$\left. + \delta \left(\zeta + 1 - \frac{z}{2} \ln \left| \frac{z+1}{z-1} \right| \right) \operatorname{sign} z \right\}, \qquad (11)$$

$$\theta(z) = \begin{cases} 0, & z < 0 \\ 1, & z > 0 \end{cases}.$$

where $z = \omega/kv_0$ and $\zeta = \frac{(kv_0/\Omega)^2}{3}$. The spectral distribution of charge-density fluctuations in a plasma in the high-frequency range reads

$$\langle \rho^2 \rangle_{k\omega} = \frac{T}{4} \left(\frac{k\omega}{\Omega} \right)^2 \frac{(\omega^2 - \omega_H^2)^2}{\omega^4 \cos^2 \vartheta + (\omega^2 - \omega_H^2)^2 \sin^2 \vartheta} \times \qquad (14).$$
$$\times \{ \delta(\omega - \omega_+) + \delta(\omega + \omega_+) + \delta(\omega - \omega_-) + \delta(\omega + \omega_-) \}.$$

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Contribution to the theory of...

Then the authors determine the electron and ion density fluctuations separately. They also determine the fluctuations of the distribution functions for the plasma particles, the electron temperature T^e and the ion temperature T^i being assumed to differ. A non-isothermal plasma can be regarded as a quasi-equilibrium system, and the fluctuations occurring in it can be studied with the aid of fluctuation theory. The following expression is obtained for the Fourier components of electron and ion density fluctuations:

$$\delta n^e(\mathbf{k},\omega) = i\frac{k}{\omega}\frac{1}{\varepsilon(k,\omega)}(Y^e_{k\omega}(1+4\pi\varkappa^i)+Y^i_{k\omega}4\pi\varkappa^e),$$
$$\delta n^i(\mathbf{k},\omega) = i\frac{k}{\omega}\frac{1}{\varepsilon(k,\omega)}(Y^e_{k\omega}4\pi\varkappa^i+Y^i_{k\omega}(1+4\pi\varkappa^e)); \qquad (18),$$
$$Y^a_{k\omega} = \int\frac{\mathbf{kv}}{k}\left(\omega-\mathbf{kv}+\frac{i}{\gamma^a}\right)^{-1}\rho^a(\mathbf{v},\mathbf{k},\omega)\,d\mathbf{v},$$

where $\varepsilon = 1+4\pi(\varkappa^e+\varkappa^i)$; $\varkappa^e$ and $\varkappa^i$ denote the electrical susceptibilities of electrons and ions respectively. From this the following expression is obtained for the spectral distribution of charge density fluctuations:

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Contribution to the theory of...

$\langle \rho^2 \rangle_{\vec{k}\omega} \equiv e^2 \langle |\delta n^e - \delta n^i|^2 \rangle_{\vec{k}\omega} = \frac{2k^2}{\omega |\varepsilon|^2} \operatorname{Im}\{T^e{}_\kappa{}^e + T^i{}_\kappa{}^i\}$. The correlators of the distribution functions are given by

$$\langle j^a(v) j^b(v') \rangle_{k\omega} = 2\pi\delta_{ab} F_0^a(v)\,\delta(v-v')\,\delta(\omega - kv) \pm \pm 2\pi \cdot 4\pi e^2 k^{-2} F_0^a(v)\, F_0^b(v')\, S^{ab}(v, v'), \quad (22)$$

the upper (lower) sign indicates equal (different) particles. The authors then generalize the results obtained to the case where the plasma is located in a constant and homogeneous magnetic field $\vec{H}_0$. Then, the correlators of the fluctuations of electron density and magnetic field strength are given by

$$e^2 \langle |\delta n^a|^2 \rangle_{k\omega} = \frac{k_i k_j}{\omega^2} \langle j_i^a j_j^a \rangle_{k\omega},$$

$$\langle \delta H_i \delta H_j \rangle_{k\omega} = \left(\frac{4\pi}{\omega}\right)^2 \frac{\eta^2}{(\eta^2-1)^2} e_{ilm} e_{jl'm'} k^{-2} k_l k_{l'} \langle j_m j_{m'} \rangle_{k\omega}, \quad (27)$$

$$e \langle \delta n^a \delta H_j \rangle_{k\omega} = -\frac{4\pi i}{c\omega} \frac{\eta^2}{\eta^2-1} e_{jm'l} \frac{k_m k_{m'}}{k^2} \{\langle j_m^a j_l^a \rangle_{k\omega} + \langle j_m^a j_l^i \rangle_{k\omega}\}.$$

Card 6/9

Contribution to the theory of...

where e... is a completely antisymmetric tensor of third rank. The scattering of electromagnetic waves by fluctuations in a free plasma is determined only by the electron density fluctuations. For a plasma located in a magnetic field $\vec{H}_0$, it is also necessary to take account of the fluctuations $\delta\vec{H}$ of the magnetic field. In the absence of a magnetic field, the differential scattering coefficient for an unpolarized wave reads

$$d\Sigma = \frac{1}{4\pi}\left(\frac{e^2}{mc^2}\right)^2\left(\frac{\omega}{\omega_0}\right)^2\sqrt{\frac{\varepsilon}{\varepsilon_0}}(1+\cos^2\theta)\,\langle|\delta n^t|^2\rangle_{q\Delta\omega}\,do\,d\omega, \qquad (28)$$

where θ is the scattering angle, do is the element of the solid angle $\vec{k}$, $\varepsilon \equiv \varepsilon(\omega) = 1 - \Omega^2/\omega^2$, $\varepsilon_0 = \varepsilon(\omega_0)$. In this formula, the frequency can be changed arbitrarily. In the presence of a magnetic field, the expression

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Contribution to the theory of...

$$d\Sigma = \frac{1}{2\pi}\left(\frac{e^2}{mc^2}\right)^2\left(\frac{\omega_1\omega}{\Omega^2}\right)^2 R\left\{|\xi|^2\langle|\delta n^e|^2\rangle_{q\Delta\omega} - \frac{en_0}{mc}\frac{\omega}{\Omega^2}\operatorname{Im}(\xi A_l\langle\delta n^e\delta H_l\rangle_{q\Delta\omega}) + \right.$$
$$\left. + \frac{n_0}{4\pi mc^2}\frac{\omega^2}{\Omega^2}A_l^* A_j\langle\delta H_l\delta H_j\rangle_{q\Delta\omega}\right\} d\omega d\omega, \qquad (29)$$
$$R = \eta^2\left\{\eta_0\left(|e_0|^2 - \frac{|e_0 k_0|^2}{k_0^2}\right)\varepsilon_{ij}e_i^* e_j^0\right\}^{-1}, \quad \xi = (\varepsilon_{ij}^0 - \delta_{ij})e_i^* e_j^0,$$
$$A_l = (\varepsilon_{kl} - \delta_{kl})e_k^* e_{lmi}(\varepsilon_{mj}^0 - \delta_{mj})e_j^0,$$

holds instead of (28), where $\vec{e}$ is the polarization vector of the scattered wave. At equal temperatures of electrons and ions, the spectrum of scattered radiation, in the absence of a magnetic field, consists of a line broadened by the Dòppler effect ($\Delta\omega \lesssim qs$) and sharp maxima at $\Delta\omega = \pm\Omega$, if $aq \ll 1$. For $\Delta\omega \gg qs_e$ there occurs only scattering by Langmuir oscillations. In the most interesting case $\Delta\omega/qs_i \gg \ln(T^e/T^i)$, the following equation holds for $\Delta\omega/qs_i \gg \ln(T^e/T^i)$ and $\Delta\omega \sim \omega_s(q)$:

$$d\Sigma = \frac{e^2 k_e^4 T^e(1+\cos^2\theta)}{16\pi(mc^2)^2(k_e^2+q^2)}\left\{\delta(\Delta\omega - \omega_s(q)) + \delta(\Delta\omega + \omega_s(q))\right\} \qquad (33).$$

Card 8/9

S/056/62/043/001/043/056
B102/B104

AUTHOR: Sitenko, A. G.

TITLE: Optic potential theory

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43, no. 1(7), 1962, 319-326

TEXT: The optic potential, being a function of the scattering amplitude and the nucleon density, describes refraction and absorption of the nucleon wave in the nucleus and is used to study the motion of a nucleon in a nucleus. The size of the nucleus is assumed to be such that the surface effects are negligible and the nuclear matter is considered to be homogeneously distributed (density n_0). The potential can then be represented by $U_0 = -4\pi n_0 f(0)/M$, if $f(0)$ is the amplitude of the elastic zero-angle scattering. For the purpose of studying nucleon scattering from density fluctuations in the interior of the nucleus, the scattering coefficient, defined by $\mathrm{Im}\, U_0$, is expressed in terms of the NN scattering amplitude and the spectral distribution $\langle \delta n^2 \rangle_{q\omega}$ of the space-time

(5),

(9);

used to calculate the nucleon
nuclear matter, the latter being considered
gas at absolute zero

Card 1/3

S/056/62/043/001/043/056
B102/B104

Optic potential theory

of nucleon interaction on $\mathcal{E}$ is investigated, nuclear matter being considered to be a superconducting nucleon gas. Then the assumption of the scattering amplitude $f(\vec{k},\vec{k}')$ being constant is dropped and the nucleus is considered on the basis of the Fermi fluid (Landau) model. It is shown that the presence of a gap in the density fluctuation spectrum of even-even nuclei leads to a diminution of the W of these nuclei compared with the W of odd nuclei. There are 5 figures.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet (Khar'kov State University)

SUBMITTED: March 4, 1962

Card 3/3

SITENKO, A.G.; TSZYAN' YU-TAY [Chien Yu-t'ai]

Coefficients of dynamic friction and diffusion in a plasma. Zhur. tekh. fiz. 32 no.11:1324-1332 N '62. (MIRA 15:11)

1. Khar'kovskiy gosudarstvennyy universitet imeni A.M.Gor'kogo.
(Plasma (Ionized gases))

S/141/63/006/001/005/018
E140/E135

AUTHORS: Sitenko A.G., and Simenog I.V.

TITLE: On fluctuations in a degenerate electron gas

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, v.6, no.1, 1963, 54-64

TEXT: The authors believe that the space-time correlations of fluctuations in an ideal Fermi gas have not previously been considered, in spite of their importance for the study of diffraction processes in such gases, e.g. the diffraction of light or electrons in metals, diffraction of nucleons in nuclear material, etc. A further point of interest is to connect the macroscopic parameters, e.g. dielectric constant of an electron gas, with the microscopic theory through the fluctuation-dissipation theorem. The simplest approach to such a study is through the method of secondary quantisation. The authors first derive the formulas

$$\langle \delta n^2 \rangle^{0}_{k\omega} = \frac{m^2 T}{2\pi k} \ln \frac{1 + e^{\mu/T-(\omega-k^2/2m)^2 m/2k^2 T}}{1 + e^{\mu/T-(\omega+k^2/2m)^2 m/2k^2 T}} \operatorname{cth} \frac{\omega}{2T} ; \qquad (12)$$

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$$\langle \delta \underline{j}_{\perp}^2 \rangle_{k\omega}^{0} = \frac{mT^2}{\pi k}\left\{ \zeta\left[\frac{\mu}{T} - \left(\omega - \frac{k^2}{2m}\right)^2 \frac{m}{2k^2T}\right] - \zeta\left[\frac{\mu}{T} - \left(\omega + \frac{k^2}{2m}\right)^2 \frac{m}{2k^2T}\right]\right\} \operatorname{cth} \frac{\omega}{2T} \qquad (13)$$

for the spectral distributions of density fluctuations and the transverse current in an ideal Fermi gas at arbitrary temperature T, where

$$\zeta(x) = \int_0^\infty (e^{x+t} + 1)^{-1}\, t^{dt}.$$

This is then applied to obtain the dielectric constant of a degenerate electron gas, obtaining the well-known formula usually derived in the chaotic-gas approximation. The dispersion of plasma oscillations, and the fluctuations of a completely degenerate electron gas are also found. There are 5 figures.

Card 2/3

On fluctuations in a degenerate... S/141/63/006/001/005/018
E140/E135

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet
(Khar'kov State University)

SUBMITTED: February 19, 1962

Card 3/3

L 17297-63 EWT(1)/EWG(k)/BDS/EEC(b)-2/ES(w)-2 AFFTC/ASD/ESD-3/AFWL/
IJP(C)/SSD Pz-4/Pab-4/Pi-4/Po-4 AT

ACCESSION NR: AP3004833 S/0141/63/006/003/0469/0479

82
81

AUTHOR: Sitenko, A. G.; Kirochkin, Yu. A.

TITLE: Dispersion of electromagnetic waves by fluctuations in plasma in the presence of a magnetic field

SOURCE: IVUZ. Radiofizika, v. 6, no. 3, 1963, 469-479

TOPIC TAGS: electromagnetic wave, plasma, plasma fluctuations, thermal fluctuations

ABSTRACT: The present work, based on the theory of fluctuations developed by A. Akhiezer, et al. (ZhTF, 41, 644, 1961), considers scattering of electromagnetic waves by fluctuations in nonisothermal plasma in the presence of a magnetic field; specifically, scattering by low-frequency Alfven and magnetoacoustical fluctuations. Both electron-density and electron-velocity fluctuations are taken into account, as well as magnetic-field fluctuations. Spectral distribution of

Card 1/2

L 17297-63

ACCESSION NR: AP3004833

scattered radiation is determined. Neglecting the motion of ions, the electromagnetic field in plasma is described by a set of differential equations. This set is reduced to a wave equation which is solved and investigated. Correlation functions of electron-density, electron-velocity, and magnetic-field fluctuations are expressed in terms of correlators of electron and total currents with the use of Maxwell equations. It is noted that in a strongly nonisothermal plasma, the fundamental line in the spectrum of scattered radiation is split into four lines associated with the wave scattering by magnetoacoustical fluctuations. Orig. art. has: 41 formulas.

ASSOCIATION: Kharkovskiy gosudarstvenny*y universitet (Kharkov State University)

SUBMITTED: 07Jul62 DATE ACQ: 27Aug63 ENCL: 00

SUB CODE: PH NO REF SOV: 004 OTHER: 004

Card 2/2

SITENKO, A.G. [Sytenko, O.H.]; KHARCHENKO, V.F.

Polarization phenomena in direct nuclear reactions taking spin-orbital interaction into account. Ukr.fiz.zhur. 7 no.11:1149-1159 N '62. (MIRA 15:12)

1. Khar'kovskiy gosudarstvennyy universitet.
(Nuclear reactions)

S/185/63/008/001/001/024
D234/D308

SITENKO, A.G.

AUTHORS: Sytenko, O. H. and Drobachenko, O. V.

TITLE: Theory of non-local potential

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 8, no. 1, 1963, 5-10

TEXT: The authors consider proton scattering by protons assuming that the interaction is described by a non-local potential and taking into account the Coulomb repulsion. The equation of the radial function of the S state is solved. The effective radius and the form parameter are expressed in terms of the coefficients of the expansion of the exact solution u and the asymptotic one $\bar{u}$, assuming small energies. The scattering length in the limit k = 0 is obtained in terms of integrals of Bessel functions, then u_0, u_1, $\bar{u}_0$, $\bar{u}_1$ are determined. The scattering parameters expanded in powers of $1/\beta R$ are

Card 1/ 3

$$-\frac{1}{\beta a} = \frac{1}{2}\left(\frac{\beta^3}{\pi^2\lambda} - 1\right) + \left(\ln\frac{\beta R}{2} - \frac{\beta^3}{\pi^2\lambda} + 1 - \gamma\right)\frac{1}{\beta R} + \left(\frac{\beta^3}{\pi^2\lambda} - 1\right)\frac{1}{(\beta R)^2} + \ldots \quad (21)$$

$$\beta r_o = 1 + \frac{2\beta^3}{\pi^2\lambda} - \frac{2}{3}\left(1 + \frac{5\beta^3}{\pi^2\lambda}\right)\frac{1}{\beta R} + \ldots, \quad (22)$$

$$P(\beta r_o)^3 = -\frac{\beta^3}{2\pi^2\lambda} + \left(\frac{8}{15}\cdot\frac{\beta^3}{\pi^2\lambda} - \frac{1}{30}\right)\frac{1}{\beta R} + \ldots, \quad (23)$$

γ being Euler's constant. The depth parameter of the potential is

$$S = \frac{\pi^2\lambda}{\beta^3} \quad (24)$$

Card 2/3

S/185/63/008/001/001/024
D234/D308

Theory of non-local potential

and the characteristic radius is

$$b = \frac{3}{\beta}\left(1 - \frac{4}{3\beta R}\right) \qquad (25)$$

The potential parameters and the effective radius are tabulated and compared with those for the proton-neutron system. The differences are small but exceed experimental errors; coulombic repulsion decreases S and b. There is 1 table.

ASSOCIATION: Kharkivs'kyy derzhuniversytet im. O. M. Hor'koho (Kharkiv State University im. A. M. Gor'kiy); Kharkivs'kyy aviatsiynyy instytut (Kharkiv Institute of Aviation)

SUBMITTED: July 25, 1962

Card 3/3

SITENKO, A.G. [Sytenko, O.H. ; SIMENOG, I.V. [Symenoh, I.V.]

Theory of fluctuations in superconductors. Ukr. fiz. zhur. 8 no.5:537-548 My '63. (MIRA 16:8)

1. Khar'kovskiy gosudarstvennyy universitet i Institut fiziki AN UkrSSR, Kiyev.

SITENKO, A.G. [Sytenko, O.H.]; DROBACHENKO, O.V.

Effect of nonlocal nucleon-nucleon interaction on the cross section of the photoeffect. Ukr. fiz. zhur. 8 no.7:728-731 Jl '63. (MIRA 16:8)

1. Khar'kovskiy gosudarstvennyy universitet im. Gor'kogo i Khar'kovskiy aviatsionnyy institut.
(Nuclear reactions) (Photoelectricity)

SITENKO, A.G.; KIROCHKIN, Yu.A.

Scattering and transformations of waves dur to thermal fluctuations in magnetohydrodynamics. Zhur. tekh. fiz. 33 no.11:1354-1365 N '63. (MIRA 16:12)

1. Institut fiziki AN UkrSSR i Khar'kovskiy gosudarstvennyy universitet.

SITENKO, A. G.; BEREZHNOY, Yu. A.

"Concerning the Diffraction Breakup of Deuterons."

report submitted for All-Union Conf on Nuclear Spectroscopy, Tbilisi, 14-22 Feb 64.

Inst Physics, AS UkSSR

SITENKO, A. G., Kiev

"Inelastic scattering of electrons by nuclei and pair correlations in nuclei."

report submitted for Intl Conf on Low & Medium Energies Nuclear Physics, Paris, 2-8 Jul 64.

L 1593-66 EWT(l)/EPF(n)-2/EWG(m)/EPA(w)-2 IJP(c) AT

AM5007590 BOOK EXPLOITATION UR/ 533.9

44,55 44,55 44,55 44,55 76 B+1

Akhiyezer, A. I.; Akhiyezer, I. A.; Polovin, R. V.; Sitenko, A. G.; Stepanov, K. N.

21,44,55 44,55

Collective oscillations in plasma (Kollektivnyye kolebaniya v plazme) Moscow, Atomizdat, 1964. 0162 p. illus., biblio. 3,700 copies printed.

TOPIC TAGS: plasma physics, plasma oscillation, charged particle, magnetic field plasma stability, particle distribution, particle scatter

PURPOSE AND COVERAGE: This book is a presentation of the theory of linear oscillations in "Collisiouless" plasma in which paired collisious do not exert significant influence on its oscillations properties. Three basic problems are presented in the book: natural oscillations spectra, stability and instability of various particle distributions, and fluctuations in homogeneous plasma. The book will be of interest to scientists working in the fields of physical and technological problems such as: diffusion of radio waves in the ionosphere and other plasmas, stellar radioemission, microradiowave amplification and generation with the aid of plasma, acceleration of charged particles in plasma, relaxation in plasma, plasma diagnosis, etc.

Card 1/2

S/0048/64/028/001/0041/0045

AP4010288

AUTHOR: Sitenko, A.G.; Kharchenko, V.F.

TITLE: Bound state of three nucleons and scattering of a nucleon by two others in a bound state [Report, Thirteenth Annual Conference on Nuclear Spectroscopy held in Kiev, 25 Jan to 2 Feb 1963]

SOURCE: AN SSSR, Izvestiya. Seriya fizicheskaya, v.28, no.1, 1964, 41-45

TOPIC TAGS: three-nucleon motion, nucleon scattering, Yamaguchi potential, nucleon-nucleon scattering, bound nucleon states, scattering length

ABSTRACT: Investigation of the problem of motion of three nucleons can yield additional information on the interaction between nucleons. In contrast to the problem of two-nucleon motion in the range of low energies, the problem of the motion of three nucleons proves to be more sensitive to the form of the two-particle potential. Hence the question of selecting the interaction potential to be used for the calculations is very important. In the present study there is considered the problem of the motion of three nucleons on the assumption that theinteraction between them is described by a nonlocal potential with separable variables (Y.Yamaguchi,Phys.Rev., 95,1628,1954). The problem of the motion of two nucleons can be solved precisely

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in using this type of nonlocal potential. In the case of the problem of three nucleons this potential leads to a system of two integral equations for the total spin S = 1/2 and one integral equation for S = 3/2. On the basis of the general equations there are considered the particular cases of the tritium nucleus and elastic scattering of a slow neutron by a deuteron. For the latter case there are written the expressions for the amplitudes of elastic scattering of the neutron by the deuteron in the doublet and quartet states. The results of the calculations of the scattering length are compared with experimental data. The agreement is good for the quartet case, but poor for the doublet case. Orig.art.has: 26 formulas and 3 figures.

ASSOCIATION: Khar'kovskiy gosudarstvenny*y universitet (Khar'kov State University); Institute fiziki Akademii nauk SSSR (Institute of Physics, Academy of Sciences,SSSR)

SUBMITTED: 00 DATE ACQ: 10Feb64 ENCL: 00

SUB CODE: NS NR REF SOV: 008 OTHER: 006

Card 2/2

SITENKO, Aleksey Grigor'yevich; SHESTOPALOV, V.P., prof., otv. red.; YAKIMENKO, L.I., red.

[Electromagnetic fluctuations in a plasma] Elektromagnitnye fluktuatsii v plazme. Khar'kov, Izd-vo Khar'kovskogo univ., 1965. 184 p. (MIRA 18:5)

L 23014-66 EWT(m)/T
ACC NR: AP6014825 SOURCE CODE: UR/0367/65/001/006/0994/1001

AUTHOR: Sitenko, A. G.; Kharchenko, V. F. 28 B

ORG: Institute of Physics, AN UkrSSR (Institut fiziki AN UkrSSR)

TITLE: Neutron-deutron doublet scattering length and the three-nucleon bound state taking tensor forces into account

SOURCE: Yadernaya fizika, v. 1, no. 6, 1965, 994-1001

TOPIC TAGS: nucleon, neutron scattering, neutron, deuteron, integral equation

ABSTRACT: The motion of three nucleons is considered, the interaction between which is described by the Yamaguchi potential, taking tensor forces into account. The problem of three nucleons in the bound state and the scattering of a zero-energy neutron on a deuteron are reduced to the solution of a system of one-dimensional integral equations. The doublet neutron-deuteron scattering length, binding energy, and wave function of three nucleons in the bound state are determined from a numerical solution of the integral equations. Orig. art. has: 2 figures and 18 formulas. [Based on authors' Eng. abst.] [JPRS]

SUB CODE: 20 / SUBM DATE: 17Aug64 / ORIG REF: 010 / OTH REF: 007

Card 1/1 pla

2

SITENKO, A.G.; SMENOG, I.V.

Rule of sums and two-nucleon correlations in nuclei. Izv. fiz. 2
no.4:603-613 O '65. (MIRA 18:11)

1. Institut fiziki AN UkrSSR.

[illegible], A.I. [Lytenko, O.I.]; KHARCHENKO, V.F.

Problem of the motion of three nucleons taking tensor forces into account. Ukr. fiz. zhur. 10 no.5:469-480 My '65. (MIRA 18:5)

1. Institut fiziki AN UkrSSR, Kiyev.

L 60332-65 EWT(1)/EPF(n)-2/EWG(m)/EPA(w)-2 Pz-6/Pc-4/Pi-4 IJP(c) AT
ACCESSION NR: AP5018291 UR/0057/65/035/007/1165/1176
533.9 46
43
B

AUTHOR: Sitenko, A. G.; Radziyevskiy, V. N. 21

TITLE: On the fluctuations in a magnetized plasma that is not in equilibrium

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 35, no. 7, 1965, 1165-1176

TOPIC TAGS: magnetoactive plasma, fluctuation , plasma beam interaction, plasma charged particle, plasma electromagnetic wave

ABSTRACT: The authors discuss the electric field and current fluctuations in a uniform rarefied plasma in a uniform magnetic field. The plasma is assumed to be in a quasi-equilibrium state in which the ion and electron velocity distributions are different and non-Maxwellian, so that the fluctuation-dissipation theorem is not applicable. The electron and ion fluctuations are first treated as independent and their coupling through the action of the self-consistent field is subsequently taken into account. Collisions between the ions and electrons are neglected throughout. The general equations derived for the current and field fluctuations are rewritten for the specific case of a plasma that is traversed by a neutral beam of charged particles moving parallel to the applied

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L 60332-65
ACCESSION NR: AP5018291

magnetic field. Simple approximate expressions are derived for those fluctuations of this system that are associated with Langmuir waves and with magnetic sound. The interaction of different kinds of waves with the fluctuations is discussed. There is possible not only incoherent scattering but also a quasi-coherent scattering with frequency change, associated with Langmuir and Alfven waves and with magnetic sound. It is also possible for waves of one kind to give rise to waves of another kind by interaction with the fluctuations. Equations describing these processes are derived. The interaction of a moving charged particle with the fluctuations of a (not necessarily magnetized) plasma is discussed. When the velocity of the particle is less than the thermal velocities in the plasma the fluctuations accelerate the particle. A more rapidly moving particle loses energy to the fluctuations, and these energy losses can become anomalously large under certain circumstances, which are discussed in some detail. "In conclusion, we express our gratitude to A.I.Akhiyezer and

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L 60332-65 2
ACCESSION NR: AP5018291

I.A.Akhiyezer for a valuable discussion of the problems treated here." Orig. art. has: 49 formulas.

ASSOCIATION: Institut fiziki, AN UkrSSR, Kiev (Institute of Physics, AN UkrSSR)

SUBMITTED: 17Sep64 ENCL: 00 SUB CODE: ME

NR REF SOV: 011 OTHER: 002

Card 3/3 dap

L 15661-66 EWT(1)/ETC(F)/EPF(n)-2/EWG(m)/T IJP(c) AT
ACC NR: AP6000219 SOURCE CODE: UR/0056/65/049/005/1591/1600

AUTHORS: Sitenko, A. G.; Gurin, A. A.

ORG: Institute of Physics, Academy of Sciences, UkrSSR (Institut fiziki Akademii nauk UkrSSR)

TITLE: Effect of particle collisions on plasma fluctuations

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 49, no. 5, 1965, 1591-1600

TOPIC TAGS: plasma oscillation, particle collision, temperature dependence, plasma temperature, plasma density, kinetic equation, collision integral

ABSTRACT: The authors studied the effect of binary collisions on plasma fluctuations, using a kinetic equation with a model collision integral in which the energy and momentum of the particles are conserved. The introduction of a model collision integral makes it possible to study plasma fluctuations for arbitrary values of the effective binary collision frequency, and not merely limiting low or high values, as in the past. A single component non-isothermal plas-

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L 15661-66

ACC NR: AP6000219

ma is investigated. The fluctuation-dissipation theorem is used to find a general expression for the correlation function of the random forces. Allowance for the binary collisions between particles leads to additional correlation of the random forces in velocity space. General expressions are obtained for the spectral distribution of the particle density fluctuations and for the temperature fluctuations and for the dependence of the fluctuation spectrum on the particle density, temperature, and binary collision frequency. The relation between fluctuations in a collisionless plasma and fluctuations in hydrodynamics is also studied as is the scattering of electromagnetic waves by fluctuations of density and temperature. It is shown that the temperature fluctuations exert an appreciable influence on the scattering with small change of frequency in the case of long wavelengths. Orig. art. has: 2 figures and 26 formulas.

SUB CODE: 20,12/SUBM DATE: 08Jun65/ ORIG REF: 003/ OTH REF: 003

OC

Card 2/2

L 27479-66 EWT(m)/T

ACC NR: AT6008416 SOURCE CODE: UR/3137/65/000/142/0003/0018

AUTHOR: Sitenko, A. G.; Simenog, I. V.

ORG: None

TITLE: Sum rules and two-nucleon correlations in nuclei

SOURCE: AN UkrSSR. Fiziko-tekhnicheskiy institut. Doklady, no. 142/T-016, 1965. Dvukhnuklonnyye korrelyatsii v yadrakh, 3-18

TOPIC TAGS: inelastic scattering, scattering cross section, electron scattering, correlation statistics, spectral distribution, nuclear shell model, even even nucleus, spin orbit coupling

ABSTRACT: The authors establish a general relation between the cross section for inelastic scattering of electrons and the spectral distributions of two-nucleon correlation functions in the nucleus. The cross section for inelastic scattering of a fast electron by an individual nucleon of the nucleus is first calculated on the basis of perturbation theory under the assumption that the nucleon is non-relativistic. This cross section is then expressed in terms of the spectral dis-

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L 27479-66
ACC NR: AT6008416

0

tributions of the space-time correlation functions for the nucleons in the nucleus in terms of the current density, spin density, and spin current operators of the nucleons. This is followed by calculation of the two-particle correlation functions for the nucleons in the nucleus on the basis of the shell model of the nucleus. The angular and energy distribution of the electrons in inealstic scattering by even-even nuclei can then be determined on the basis of the obtained relations. The equations are simplified noticeably if spin-orbit interaction is neglected. By way of an example, some rules for the correlation functions are established for the nuclei He^4, O^{16}, and Ca^{40}, and the influence of the motion of the center of mass on the correlation functions is considered with He^4 as an example. Orig. art. has: 3 figures and 43 formulas.

SUB CODE: 20/ SUBM DATE: 00 ORIG REF: 001/ OTH REF: 010

Card 2/2 BLG

L 27480-66 EWT(1)/EWT(m)/T IJP(c) AT

ACC NR: AT6008417 SOURCE CODE: UR/3137/65/000/142/0019/0031

AUTHOR: Sitenko, A. G.; Simenog, I. V.

ORG: None

TITLE: Inelastic scattering of electrons by nuclei and two-particle correlations in nuclei

SOURCE: AN UkrSSR. Fiziko-tekhnicheskiy institut. Doklady, no. 142/T-106, 1965. Dvukhnuklonnyye korrelyatsii v yadrakh, 19-31

TOPIC TAGS: inelastic scattering, scattering cross section, electron scattering, correlation statistics, spectral distribution, Fermi gas

ABSTRACT: The authors establish a general relation between the cross section for the inelastic scattering of fast electrons by nuclei and the spectral distributions of two-nucleon correlation functions in the nucleus in the case when the inelastic scattering is accompanied by a transfer of a definite momentum and a definite energy from the electron to the nucleus. The expression shows that inelastic scattering of electrons by nuclei is connected both with fluctuations of

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L 27480-66
ACC NR: AT6008417 O

the nucleon density in the nuclei and with fluctuations of the nucleon currents; the latter acquire a more important role in the case of large-angle scattering of the electrons. The functions of two-nucleon space-time correlation, brought about by the Pauli principle and the two-particle interaction between nucleons, are then calculated for simple nuclear models, such as the model of the ideal Fermi gas, the superfluid model, and the Fermi-liquid model. The collective excitations due to residual interaction between the nucleons and the nuclei are considered. Orig. art. has: 8 figures and 21 formulas.

SUB CODE: 20/ SUBM DATE: 00/ ORIG REF: 006/ OTH REF: 005

Card 2/2 BLG

L 29283-66 EWT(m)/T

ACC NR: AP6019335 SOURCE CODE: UR/0367/66/003/003/0521/0525

AUTHOR: Sitenko, A. G.; Berezhnoy, Yu. A. 25 B

ORG: Physicotechnicaling Institute, AN UkrSSR (Fiziko-tekhnicheskiy institut AN UkrSSR) 19

TITLE: Effect of the deuteron internal structure on diffraction scattering

SOURCE: Yadernaya fizika, v. 3, no. 3, 1966, 521-525

TOPIC TAGS: deuteron, particle diffraction, neutron interaction, proton interaction, deuteron scattering

ABSTRACT: The influence of the finite radius of the neutron-proton nuclear interactions in the deuteron and of the deuteron internal structure on the magnitudes of the integral cross-sections of various diffraction interactions between deuterons and nuclei and on the differential cross-section for elastic deuteron scattering is considered. The authors express thanks to V. A. Yamnitskiy for assistance in programming the numerical calculations on an electric computer. Orig. art. has: 5 figures and 13 formulas. [Based on authors' Eng. abst.] [JPRS]

SUB CODE: 20 / SUBM DATE: 28May65 / ORIG REF: 004 / OTH REF: 001

Card 1/1 CC

ACC NR: AP6019627 (A,N) SOURCE CODE: UR/0048/66/030/002/0328/0330

AUTHOR: Sitenko, A.G.; Kharchenko,V.F.

29 B

ORG: Institute of Physics of the Academy of Sciences of the UkrSSR (Institut fiziki Akademii nauk UkrSSR)

TITLE: Taking tensor forces into account in the three-nucleon problem /Report, Fifteenth Annual Conference on Nuclear Spectroscopy and Nuclear Structure, held at Minsk, 25 January to 2 February 1965/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 2, 1966, 328-330

TOPIC TAGS: nuclear structure, nuclear force, nucleon interaction, three body problem, tritium

ABSTRACT: The authors (Izv. AN SSSR. Ser. fiz., 28, 41 (1964); Nucl. Phys., 49, 15 1963)) have previously treated the three-nucleon problem with the assumption of non-local central two-body forces. In the present paper they extend their previous calculations with the aid of the potential of Yoshio Yamaguchi and Yoriko Yamaguchi (Phys.Rev. 95, 1635 (1954)) to take tensor forces into account. The calculation of the zero-momentum neutron-deuteron scattering length and the triton binding energy is reduced in the case of tensor forces, as previously in the case of central forces, to the solution of a set of linear integral equations. The integral equations were solves numerically with the aid of a computer, using values of the parameters in the

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Card 2/2 hs

ACC NR: AP7004570 SOURCE CODE: UR/0056/65/049/005/1591/1600

AUTHOR: Sitenko, A. G.; Gurin, A. A.

ORG: Institute of Physics, AN UkrSSR (Institut fiziki AN UkrSSR)

TITLE: Effect of particle collisions on fluctuations in a plasma

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki v. 49, no. 5, 1965, 1591-1600

TOPIC TAGS: particle collision, plasma physics

ABSTRACT: The authors use the kinetic equation with the Bhatnagar-Gross-Krook collision integral model as the basis for an investigation of the effect of pair collisions between particles on fluctuations in a plasma. The introduction of the model collision integral makes it possible to investigate plasma fluctuations for an arbitrary value of the effective pair collision frequency. The article investigates the case of a single-component, nonisothermal plasma. The fluctuation-dissipation relation is used to find a general expression for the correlation function of random forces. It is shown that allowance for pair collisions between particles leads to an additional correlation of random forces in the velocity space. General formulas are obtained for the spectral distributions of particle density fluctuations and temperature fluctuations. These formulas are used to investigate the effect of the magnitude of the effective pair collision frequency on the shape of the spectrum of particle density and temperature fluctuations, from the collisionless case to hydrodynamics. Orig. art. has: 2 figures and 26 formulas. [JPRS: 34,657]

SUB CODE: 20 / SUBM DATE: 08Jun65 / ORIG REF: 003 / OTH REF: 003

Card 1/1

L 10241-67

ACC NR: AP6028553 SOURCE CODE: UR/0053/66/089/002/0227/0258

AUTHOR: Sitenko, A. G. S/

ORG: Institute of Physics, AN UkrSSR, Kiev (Institut fiziki AN UkrSSR)

TITLE: Scattering and transformation of waves in a magnetoactive plasma

SOURCE: Uspekhi fizicheskikh nauk, v. 89, no. 2, 1966, 227-258

TOPIC TAGS: magnetoactive plasma, plasma wave propagation, electromagnetic wave scattering, dispersion equation, plasma interaction

ABSTRACT: This is a review paper devoted to a theoretical investigation of the electrodynamic properties of a homogeneous magnetoactive plasma. The propagation of waves and excitation of waves by external currents in such a plasma are analyzed on the basis of kinetic theory. The fluctuations of different physical quantities characterizing the state of the magnetoactive plasma are investigated, as are processes of the scattering of waves and their mutual transformation by fluctuations in the plasma. The section headings are: 1. Electrodynamic properties of a magnetoactive plasma (the dielectric tensor and its connection with the particle distribution, the dispersion equation, wave polarization, and energy flux density). 2. Waves in a magnetoactive plasma (high-frequency and low-frequency waves). 3. Excitation of waves in a magnetoactive plasma by external current. 4. Fluctuations in a magnetoactive plasma (collective coherent fluctuations and their correlation functions, effective temperature, fluctuation in equilibrium and nonequilibrium plasmas). 5. Scattering and transforma-

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L 10241-67

ACC NR: AP6028553 O

tion of electromagnetic waves in a magnetoactive plasma (excitation of high-frequency waves, scattering and transformation of electromagnetic waves by incoherent fluctuations, scattering and transformation by coherent fluctuations, scattering and transformation by Langmuir fluctuations, and scattering and transformation by low-frequency fluctuations). 6. Scattering and transformation of Langmuir waves in a magnetoactive plasma (by incoherent and coherent fluctuations). 7. Transformation of low frequency waves by Langmuir fluctuations in the magnetoactive plasma. Orig. art. has: 125 formulas.

SUB CODE: 20/ SUBM DATE: 00/ ORIG REF: 029/ OTH REF: 012

Card 2/2 bjp

SITENKO, M., brigadir

On the right track. Avt.transp. 42 no.1:7 Ja '64. (MIRA 17:2)

1. Brigada shoferov 1-go Rizhskogo taksomotornogo parka.

SYTENKO, T.N.

CARD 1 / 2 PA - 1876

SUBJECT USSR / PHYSICS
AUTHOR LJASENKO,V.I., SYTENKO,T.N.
TITLE The Electric Surface Conductivity of Germanium.
PERIODICAL Žurn.eksp.i teor.fis,31,fasc.5,905-907 (1956)
Issued: 1 / 1957

Here the exterior electric field was used as a medium for the reversible modification of the surface charge. A monocrystalline Germanium plate (with soldered-on contacts for measuring the Hall effect and conductivity) was pasted onto thin mica foils (30 to 50μ) by means of polysterol varnish. A metal plate was pasted onto the reversed side of the mica foil. The Hall effect and conductivity were measured in the presence of an electric field(at + V and at - V on the metal plate) and also without such a field. From the results of these measurements the effective value of the mobility u_e was determined. The results of these computations are shown for some samples in a table. Measurements were repeated several times and were found to be absolutely reproducible.
Under the effect of the exterior electric field the resistances of the samples with electronic as well as with own conductivity increased at + V and diminished at - V on the metal plate. Also Hall's electromotoric force V_x and the mobility u_e were measured. At -V on the metal plate they increased and at +V they diminished. If a surface zone of electric conductivity exists, the mobility of the electrons on the surface is lower than in the interior of the sample

LYASHENKO, V.I. [Liashenko, V.I.]; SITENKO, T.N. [Sytenko, T.N.]

Conductivity of a Ge surface. Ukr.fiz. zhur. 3 no.1:64-70 Ja-F '58. (MIRA 11:4)

1.Institut fiziki URSR.
(Germanium--Electric properties)
(Hall effect)

SITENKO, T.N. [Sytenko, T.M.]

Effect of an electric field on Hall effect in Ge at various temperatures [with summary in English]. Ukr.fiz.zhur. 3 no.4:475-481 Jl-Ag '58. (MIRA 11:12)

1. Institut fiziki AN USSR.
(Hall effect) (Germanium) (Electric fields)

22044

S/181/61/003/004/010/030
B102/B214

24.7600 (1137, 1158, 1160)

AUTHORS: Sytenko, T. N. and Koshel', O. N.

TITLE: Effect of the surface condition on the Hall effect and the magnetic resistance of germanium

PERIODICAL: Fizika tverdogo tela, v. 3, no. 4, 1961, 1079-1084

TEXT: It has been shown by the authors in earlier papers that the Hall effect and the magnetic resistance depend essentially on the condition of the surface of a semiconductor. The mechanism of the scattering of excess carriers is important for the interpretation of a number of surface-sensitivity effects. Therefore, the authors carried out further investigations of these effects for different treatments of the surface and are reporting on the results in the present paper. The samples were cut from a p-type Ge single crystal; they had a resistivity ρ = 42 ohm.cm and a volume lifetime τ = 300 μsec. After etching with CP-4 (SR-4) they had a size of 0.4 × 1.0 × 0.017 cm (12-I) and 0.4 × 1.2 × 0.0165 cm (11-I). The measurements were made at a constant temperature, (+ 20.5 ± 0.5)°C, in the field of 3000 oe, and at a pressure of 10^{-6} mm Hg 15 sec after the

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field had been applied. The conductivity of the samples was measured along with the Hall potential difference. The maximum of the Hall constant nearly coincided with the minimum of conductivity. The results obtained proved to be well reproducible. By a short action of an electric field only the filling of the surface states was altered. To influence the energetic structure of the surface, samples 11-I and 12-I were etched once more in boiling H_2O_2, but no essential changes occurred. Under the action of the electric field, an electric charge is induced in the semiconductor, which is captured in part by surface levels. The dependence of the conductivity of the space-charge layer on the band curvature of the surface for different volume-carrier concentrations, found theoretically by Schrieffer (Phys. Rev. 97, 641, 1955) and Garrett and Brattain (Phys. Rev. 99, 376, 1955), agrees well with the experimental results. The observed increase in the change of conductivity relative to the minimum, occurring under the action of the electric field after etching in H_2O_2, leads to the conclusion that the chemical treatment affects the concentration of surface levels and their position. This is also indicated by the fact that the form of the dependence of the Hall constant on the

Effect of the surface ...

electric field is altered after etching in H_2O_2. The results relating to the measurement of the Hall constant R_X and $(\Delta\rho/\rho)_\perp$ are compared with theoretical results of Petritz and Zemel, and those obtained for $(\Delta\rho/\rho)_\parallel$ with results of G. Ye. Pikus (ZhTF, XXVI, 22, 1956). Results of the comparison are shown in Figs. 2 and 3. It is seen that a consideration of the light holes slightly improves the agreement between theory (Petritz, Zemel) and experiment. The authors carried out the calculations for light holes of the following parameters: $r = 2.25 \cdot 10^{-2}$, $b = 7.5$ (r is the concentration and b the mobility ratio of light and heavy holes). The theory of Petritz and Zemel is discussed in detail. The comparison of the results with the theory of Pikus showed that the effect of surface recombination on $\Delta\rho/\rho H^2$ was insignificant under the present experimental conditions. It was found further that the different character of the dependence of $\Delta\rho/\rho$ on the external electric field for two different orientations of the sample in the magnetic field at $\left(\frac{\Delta\rho}{\rho}\right)_\perp > \left(\frac{\Delta\rho}{\rho}\right)_\parallel$ continued to exist even in the absence of any band curvature. The authors

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Effect of the surface ...

thank Professor V. I. Lyashenko, Doctor of Physical and Mathematical Sciences, for suggesting the topic and guiding the work; and O. V. Snitko, Candidate of Physical and Mathematical Sciences, for advice and a discussion. There are 3 figures and 14 references: 7 Soviet-bloc and 7 non-Soviet-bloc.

ASSOCIATION: Institut fiziki AN USSR Kiyev (Institute of Physics, AS UkrSSR, Kiyev)

SUBMITTED: July 28, 1960 (initially) and November 30, 1960 (after revision)

SITENKO, V. M.

PA 30T49

USSR/Medicine - Roentgen Rays — Jul 1947
Medicine - Pleurisy

"X-ray Examination of Pleurisy Nodules with Passage Through Fistulas of Contrasting Material," V. M. Sitenko, E. K. Shatkovskiy, Leningrad, 4 pp

"Vrachebnoye Delo" No 7

In the process of treatment of necrotic pleurisy and chronic empyema it is most important to locate the area affected, the degree of the infection, and the dimensions of the affected area. For this x-ray examinations are conducted. Short description of x-ray examination procedure. Experiments were conducted at the Clinic of Practical Surgery imeni S. P. Fedorov

LC — 30T49

USSR/Medicine - Roentgen Rays (Contd) — Jul 1947

(Chief of Research: Prof V. N. Shamov), Military Medical Academy imeni S. M. Kirov.

LC — 30T49

SITENKO, V. M.

Mil. Med. Acad. im. S. M. Kirov (Docent, 1st Faculty Surgical Clinic, -c1948-; Mbr., Chair Facultative Surgery, -c1949-; Mbr., Chair Physiology, -c1949-).

"Determination of the Vascular Condition in Endarteritis Obliterans," Vop. Neyrokhirurgii, 12, No. 3, 1948;

SITENKO, V.N.

25273 SITENKO, V.N. Obliteriruyushchiy Endarteriit I Obliteriruyushii Arterioskleroz Bryushnoy Aorty. Voprosy Neyrokhirurgii, 1949, No. 4, c. 5-11

SO: letopis' No. 33, 1949

SITENKO, V. M.

Sitenko, V. M. - "On a particular functional condition of the arterial vessels of the extremities in obliterating endarteritis," In the symposium: V. N. Shamov, Kiev, 1949, p. 137-44

SO: U-4355, 14 August 53, (Letopis 'Zhurnal 'nykh Statey, No. 15, 1949)

SITENKO, V. M.

Sitenko, V. M. - "Experimental data on hemoplastic transplantations of the egg," In the symposium: V. N. Shamov, Kiev, 1949, p. 229-36

SO: U-4355, 14 August 53, (Letopis 'Zhurnal 'nykh Statey, No. 25, 1949)

SITENKO, V.M.

New data on the mechanism of the effect of sympathectomy on blood circulation in endarteritis obliterans. Vest. khir. 71 no.1:26-31 1951. (CLML 20:8)

1. Of the Department of Faculty Surgery No 1 imeni S.P. Fedorov (Head—V.N. Shamov), Military Medical Academy imeni S.M. Kirov.

1. SITENKO, V. M.

2. USSR (600)

4. Arteries - Diseases

7. Painful syndrome in endarteritis obliterans.
Vop. neirokhir. 16. No. 5. 1952

9. Monthly List of Russian Accessions, Library of Congress, January 1953. Unclassified.

SITENKO, V.M., doktor meditsinskikh nauk (Leningrad.ul.Lebedeva,d.10-g.Kv.2)

Diagnostic errors in endarteritis obliterans. Vest.khir. 75 no.3:98-102 Ap '55. (MLRA 8:7)

1. Iz kliniki 1-y fakul'tetskoy khirurgii (nach.-prof. V.N.Shamov) Voyenno-meditsinskoy ordena Lenina akademii im. S.M.Kirova.

(ENDARTERITIS OBLITERANS, diagnosis, errors)

SITENKO, V.M., doktor meditsinskikh nauk

Surgical ligation of iliac veins in decompensated heart failure [with summary in English, p.155] Vest.khir. 77 no.3:23-25 Mr '56. (MLRA 9:7)

1. Iz 1-y fakul'tetskoy khirurgicheskoy kliniki (nach. - prof. V.N.Shamov) Voyenno-meditsinskoy ordena Lenina akademii imeni S.M.Kirova.

(CARDIOVASCULAR DISEASES, surg.
ligation of iliac veins)
(VEINS, ILIAC, surg.
ligation in cardiovasc. dis.)

SITENKO, V.M., doktor meditsinskikh nauk

"Acute arterial obstruction". Z.V.Ogloblina. Reviewed by V.M. Sitenko. Vest.khir. 77 no.4:133-134 Ap '56. (MLRA 9:8)
(EMBOLISM) (OGLOBLINA, Z.V.)